
Sexually Transmitted Diseases and Native Americans: Trends in Reported Gonorrhea and Syphilis Morbidity, 1984-88

KATHLEEN E. TOOMEY, MD, MPH
ALISA G. OBERSCHHELP, BS
JOEL R. GREENSPAN, MD, MPH

Dr. Toomey is Assistant to the Director for External Relations and Dr. Greenspan is Chief, Surveillance and Information Systems Branch, Division of Sexually Transmitted Diseases, Center for Prevention Services, Centers for Disease Control, Atlanta, GA. Ms. Oberschhelp is a medical student at Emory University, Atlanta.

Tearsheet requests to Technical Information Services, Mail Stop E 07, CPS, CDC, Atlanta, GA 30333.

Synopsis.....

Native Americans experienced higher reported gonorrhea and syphilis morbidity than did non-

Native Americans from 1984 through 1988 in 13 States with large Native American populations. Gonorrhea rates among American Indians and Alaska Natives were approximately twice the rates for non-Indians. The highest gonorrhea rate was reported among Alaska Natives, with a 5-year average of 1,470 cases per 100,000, more than five times the average non-Native rate in Alaska. The average primary and secondary (P&S) syphilis rate from 1984 through 1988 was more than two times higher among Native Americans, largely due to high syphilis morbidity in Arizona and New Mexico. In Arizona the average American Indian P&S syphilis case rate was seven times higher than the non-Indian rate. True rates for sexually transmitted diseases (STD) among Native Americans may be higher than those reported due to racial misclassification of Native American cases, particularly in nonreservation areas. Improved recognition and reporting of STD cases among Native Americans are needed to target STD prevention and education more effectively.

NEARLY 2 MILLION AMERICAN INDIANS and Alaska Natives live in the United States today. Approximately 25 percent reside on reservations, 9 percent live in historic areas of Oklahoma, and 67 percent reside in other rural and urban areas of the United States (1). The socioeconomic status of Native Americans is among the lowest in the United States. More than twice the percentage of Native Americans live in poverty compared with the remaining U.S. population; 23 percent of Indian families are headed by women compared with 14 percent for the United States as a whole. Unemployment among Native Americans is more than twice that of the total population (2). High rates of injury with subsequent premature death reflect the alcoholism and drug abuse seen in many Native American communities (2,3). Other diseases, such as otitis media (2), diabetes (4,5), tuberculosis (6), and cholelithiasis (7) disproportionately affect Native Americans in the United States.

Sexually transmitted diseases (STD) are an important but little publicized health problem affecting American Indians and Alaska Natives. These infections not only contribute to sizable morbidity and health care expenditure, but they also may lead

to serious sequelae, including pelvic inflammatory disease, ectopic pregnancy, and infertility in women (8), as well as complications of pregnancy, including infections of newborns and infants (9). STD have also been associated with dysplasia and carcinoma of the cervix and penile cancer (10).

The few studies that have examined STD among Native Americans have documented a disproportionate impact of STD on American Indian and Alaska Native communities (11). In 1980, the rate of *Neisseria gonorrhoeae* infection among Alaska Natives was reported to be five times that of the non-Native population in Alaska (12). *Chlamydia trachomatis* infection has been identified at particularly high rates among Native American women. One out of four prenatal patients were found to be infected with *C. trachomatis* among Navajo women screened prenatally (13). Maternal chlamydial infections, transmitted to newborns during childbirth, led not only to chlamydial pneumonia and conjunctivitis, but also to increased rates of other upper respiratory and gastrointestinal infections in these Navajo infants (14). High rates of *C. trachomatis* infection among Inupiat women, 23 percent among women screened during routine examinations and

30 percent among women receiving prenatal care, were comparable to those ordinarily found in urban STD clinics and were nearly tenfold those of the non-Native American population in the region (15). Cervical cancer rates among American Indians and Alaska Natives are more than two times those among non-Native American women in the same States. Unpublished data from New Mexico were supplied by T. Becker, MD, PhD, Assistant Professor, University of New Mexico, August 1989; unpublished data from Alaska were supplied by M. Davidson, MD, Medical Epidemiologist, Arctic Investigations Laboratory, Anchorage, Centers for Disease Control (CDC), August 1989.

The potential explosiveness of the STD problem among Native Americans is evidenced by an increase in early syphilis on a Southwest reservation from 1982 to 1984, when case rates increased from 33 to 459 per 100,000. This outbreak included five cases of congenital syphilis and two neonatal deaths in a small community (16). These deaths could have been prevented by appropriate STD screening during pregnancy (17).

The Indian Health Service (IHS) provides care in 12 Service Areas to an estimated 61 percent of the total Native American population through directly operated and contract facilities (reference 2 and data supplied by the Population Statistics Staff, IHS, on American Indian and Alaska Native populations). STD morbidity identified by IHS facilities is reported to State STD programs and aggregated with surveillance reports from other sites. In order to document STD trends among Native Americans in the United States, we examined the total reported gonorrhea and syphilis cases for the past 5 years among Native Americans in States with large American Indian or Alaska Native populations.

Methods

We examined data on cases of gonorrhea and primary and secondary (P&S) syphilis reported in the nonmilitary population of the 13 States with Native American populations of more than 20,000 and IHS service populations of more than 1,000. In addition, these States could provide case reports that included the race of the patient including "American Indian or Alaska Native" race from 1984 through 1988. These 13 States accounted for 59 percent of the total U.S. Native American population and contributed 93 percent of the reported cases of gonorrhea and P&S syphilis cases in Native Americans in the United States.

Annual summary surveillance reports of gonor-

'The decline in reported gonorrhea and P & S syphilis cases among all races may be due to a true decrease in morbidity, or it may result from a combination of factors, including decreased reporting, less access to clinic services, and a decline in screening programs.'

rhea and P&S syphilis by State, age, sex, and race for 1984 through 1988 were obtained from the Centers for Disease Control (unpublished data, annual summary statistics, 1984-88, Division of Sexually Transmitted Diseases, Center for Prevention Services, CDC, Atlanta, GA). Race of patient was not specified for 3.5 percent of reported gonorrhea cases and 0.5 percent of reported P&S syphilis cases from these States. We included these cases without racial identifiers as "non-Native American" but did not proportionately distribute these cases into specific racial categories when calculating rates. We obtained county-specific reports of Native American and total gonorrhea morbidity in 1988 for 6 of the 13 States and for California from individual State health departments. California could not be included in the 5-year analysis because California data and reporting by race from 1984 through 1986 were incomplete. However, California was included in the analysis of Native American gonorrhea rates in 1988 for IHS Service counties and non-Service counties. (The following STD Program personnel in State health departments supplied data: M. Aubin, Washington; P. Burnett, Arizona; A. Chowning, New Mexico; J. Peschong, North Dakota; B. Desonia, Montana; J. Fowler, North Carolina; D. Harger, Oregon; G. Meagher, Colorado; B. Parsons, Oklahoma; I. Risk, Utah; L. Volmer, South Dakota; G. Williams, Minnesota; and E. Yamamoto, California.)

Native American population estimates by State and IHS service populations by State for 1984 through 1988 were obtained from the IHS Population Statistics Staff. The IHS Service population for a given State includes only those Native Americans residing within counties included within an IHS Service Area. State and county population estimates for 1984 through 1988, including estimates by race and Hispanic origin, were obtained from the U.S. Census Bureau (18). STD surveillance data report "Hispanic" as a racial category and census

Figure 1. Cases of gonorrhea per 100,000 population among Native Americans and non-Native Americans, totals for 13 States, 1984-88

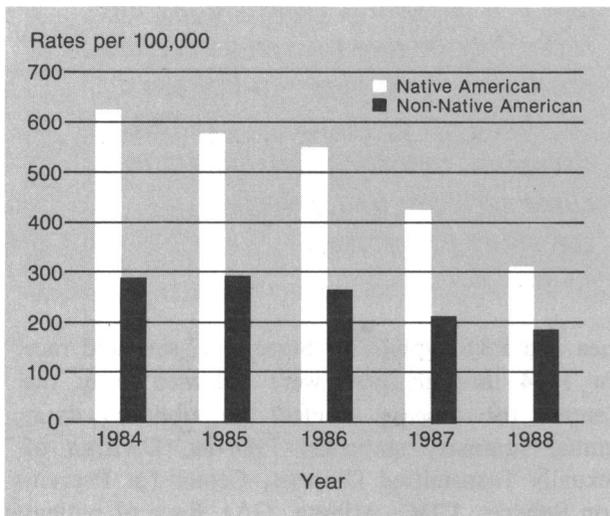


Table 1. Number of cases of gonorrhea and average case rates in Native Americans and non-Native Americans in 13 States, 1984-88

State	Native Americans		Non-Native Americans	
	Number cases	Cases per 100,000	Number cases	Cases per 100,000
Alaska ¹	5,526	1,469.66	5,984	283.66
Arizona ¹	5,074	569.22	31,835	209.08
Colorado	139	131.25	30,905	194.32
Minnesota ¹	1,171	564.59	25,230	120.94
Montana ¹	1,350	595.78	2,114	54.98
New Mexico ¹	2,647	441.31	9,908	149.41
North Carolina ²	867	241.41	163,231	531.56
North Dakota ¹	527	438.37	996	30.89
Oklahoma	2,401	247.38	50,898	331.86
Oregon	272	178.02	25,504	190.92
South Dakota ¹	1,680	637.53	1,985	61.18
Utah ³	268	238.27	4,757	58.59
Washington ¹	1,751	508.78	43,390	199.78
13 States combined	23,673	500.83	396,737	247.52
United States	25,533	316.42	4,146,346	349.18

¹ Rates for Native Americans exceeded 349 per 100,000 and were higher than rates for non-Native Americans.

² Rates for non-Native Americans exceeded 349 per 100,000.

³ Rates for Native Americans exceeded rates for non-Native Americans.

data do not. Hence, we adjusted estimates of the black and white populations by subtracting "black Hispanic" and "white Hispanic", estimated from the 1980 census, from the respective populations. Age-specific populations for both the total U.S. and total Native Americans were extrapolated using proportions derived from the 1980 census. Rates

for IHS Service Areas and non-Service Areas were compared using a normal test of proportions and *P* values based on two-tailed tests.

Results

Gonorrhea. For the 5-year period 1984 through 1988, 25,533 cases of gonorrhea were reported among American Indians and Alaska Natives in the United States (table 1). Ninety-three percent of these cases (23,673) were from 13 States, with Arizona and Alaska each reporting more than 5,000 cases. Gonorrhea cases among Native Americans comprise less than 1 percent of the total cases reported in the United States, and only 5.6 percent of the total cases reported from these 13 States. However, Native Americans account for only 2.9 percent of the total population of the 13 States. Hence, when case rates are examined, a disproportionate reported morbidity is evident among Native Americans. The average Native American rate for the 13 States combined from 1984 through 1988 is 501 per 100,000, higher than the average gonorrhea case rate for the total United States for the same period (349 per 100,000) and more than twice the average rate among non-Native Americans in the States we studied (248 per 100,000). All rates presented subsequently in the results are for the 13 States combined averaged over the 5-year period unless otherwise specified.

Among both Native Americans and non-Native Americans gonorrhea morbidity declined from 1985 through 1988 (fig. 1). However, the decline in gonorrhea rates from 1986 through 1988 was proportionately greater among Native Americans (43 percent) than among non-Native Americans (32 percent). The gonorrhea rate among Native Americans was 2.1 times that for non-Native Americans in 1986; by 1988 the Native American rate was 1.7 times that for non-Native Americans.

Gonorrhea rates for Native Americans exceed those for non-Native Americans in 9 of the 13 States we studied (table 1). In 8 States the gonorrhea rates for Native Americans exceeded 349 per 100,000 (the U.S. 5-year mean rate), with the highest case rate among Native Americans, 1,470 per 100,000, reported from Alaska. In contrast, rates for non-Native Americans exceeded 349 per 100,000 in only 1 State.

When gonorrhea rates for Native Americans are compared with those reported among other minority racial-ethnic groups in the 13 States, higher rates are generally found among blacks while lower rates are found among Hispanics. [For STD rates

among minority groups in the total United States, see Moran and coworkers (19).] The gonorrhea rate among blacks (2,045 per 100,000) is 4.1 times the rate for Native Americans (501 per 100,000). The gonorrhea rate among Native Americans is 1.8 times the gonorrhea rate for Hispanics (279 per 100,000) and more than five times higher than the gonorrhea rate among whites (97 per 100,000).

The age distribution for gonorrhea morbidity among all Native Americans is similar to that among all races in the United States as a whole, with the highest gonorrhea rates occurring among 20- to 24-year-olds. Age-specific data for the States we studied were not available.

Primary and secondary syphilis. A total of 682 cases of P&S syphilis in Native Americans were reported in the United States from 1984 through 1988, compared with 158,754 cases in non-Native Americans (table 2). The 609 cases in Native Americans reported from the 13 States we studied comprised nearly 7 percent of the total P&S syphilis cases from these States; the majority of P&S syphilis occurred in Arizona and New Mexico, which together reported 74 percent of these 609 cases. The P&S syphilis rate among Native Americans is 12.9 per 100,000, more than twice the rate for non-Native Americans (5.4 per 100,000), and comparable to the rate for the total United States during this period (13.3 per 100,000).

P&S syphilis rates declined for Native Americans after 1985, while rates among non-Native Americans remained relatively stable from 1984 through 1988 (fig. 2). P&S syphilis rates were higher among Native Americans than among non-Native Americans from 1984 through 1987, ranging from 3.9 times higher in 1985 to 1.8 times higher in 1987. Rates per 100,000 were nearly equal for Native Americans (5.5) and non-Native Americans (5.7) in 1988.

In all but 2 of the 13 States, P&S syphilis rates for Native Americans exceeded those for non-Native Americans (table 2). Rates for Indians exceeded rates for non-Indians by nearly seven times in Arizona and by four times in New Mexico. The rate for Indians in Arizona (39.5 per 100,000) was threefold higher than the average rate for the total United States for this period (13.3 per 100,000). Case rates for Native Americans peaked for Arizona and New Mexico in 1985, at 69.2 per 100,000 and 32.7 per 100,000 respectively. The decline in P&S syphilis among Native Americans in the 13 States after 1985 (fig. 2) reflects a decline in morbidity in these two States.

Figure 2. Cases of primary and secondary syphilis per 100,000 population among Native Americans and non-Native Americans, totals for 13 States, 1984-88

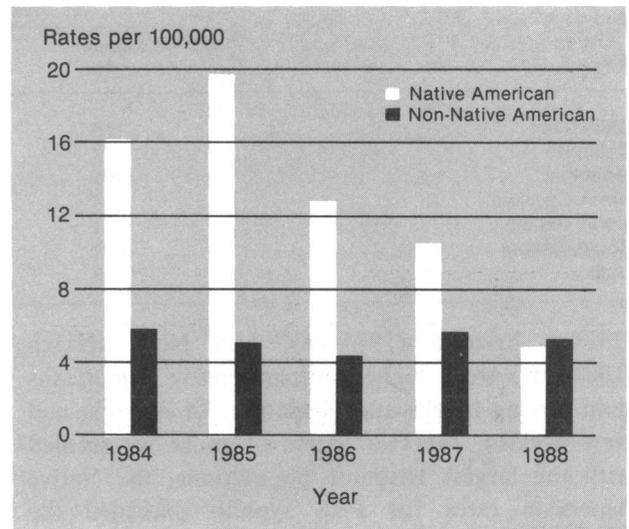


Table 2. Number of cases of primary and secondary syphilis and average case rates in Native Americans and non-Native Americans in 13 States, 1984-88

State	Native Americans		Non-Native Americans	
	Number cases	Cases per 100,000	Number cases	Cases per 100,000
Alaska	7	1.83	23	1.10
Arizona.....	351	39.52	900	5.87
Colorado	9	8.73	694	4.36
Minnesota	24	12.05	175	0.84
Montana.....	6	2.64	25	0.65
New Mexico	102	17.06	304	4.58
North Carolina ...	14	3.91	3,657	11.89
North Dakota	3	2.73	15	0.46
Oklahoma	34	3.56	859	5.61
Oregon.....	15	9.60	973	7.23
South Dakota	3	1.14	16	0.49
Utah	6	5.24	92	1.13
Washington.....	35	10.09	873	3.99
13 States combined....	609	12.94	8,606	5.36
United States ..	682	8.48	158,754	13.33

NOTE: Primary and secondary syphilis rates for Native Americans exceeded the rates for non-Native Americans in all States except Oklahoma and North Carolina.

P&S syphilis morbidity is higher among blacks than among Native Americans; the rate for blacks was 43.1 per 100,000, compared with the rate among Native Americans of 12.9 per 100,000. In contrast with gonorrhea morbidity, the case rate for P&S syphilis among Native Americans approximately equals the rate of 12.6 per 100,000 among Hispanics. However, much interstate variation existed. For example, P&S syphilis rates in Minnesota

Table 3. Reported cases of gonorrhea in Native Americans in Service Areas of the Indian Health Service (IHS) compared with cases in non-Service areas, selected States, 1988

State	IHS Service Area		Non-Service Area		P value
	Number cases	Cases per 100,000	Number cases	Cases per 100,000	
California	115	138.1	58	37.1	<.003
Colorado	7	215.5	15	77.4	.042
Montana	181	445.1	6	78.4	<.003
North Carolina	18	277.3	158	232.9	.569
North Dakota	81	370.3	9	220.9	.177
South Dakota	224	437.6	29	585.0	.171
Utah	15	131.3	16	126.7	.912

(1984), Arizona (1984-86), and New Mexico (1984-85), were higher among Native Americans than among blacks and Hispanics. In Arizona and New Mexico, the two States of those we studied with the largest Hispanic populations, the Native American rates for P&S syphilis exceeded the Hispanic rates for each year 1984 through 1988. The P&S syphilis rate for Native Americans was 6.8 times the rate among whites (1.9 per 100,000). Peak P&S syphilis rates were found among 25-29-year-olds in both the total Native American and total U.S. populations.

Gonorrhea rates for IHS Service populations. We hypothesized that reporting of cases in Native Americans from IHS Service Areas might be more complete than from other areas. To test this, we calculated the rates of gonorrhea in 1988 among Native Americans residing in IHS service counties in States where data were available. In Oklahoma, Arizona, New Mexico, and Alaska, the 1988 service populations equal the total Native American populations, and thus the service rates will not differ from the total Native American rates for each of these States.

Gonorrhea rates in Native Americans exceeded rates in non-Native Americans in three of the four States (table 1). In six States the IHS Service population rates are higher than the rates for Native Americans not living in IHS Service Areas, with significantly higher rates ($P < .05$) in California, Colorado, and Montana (table 3). In comparison, significantly higher rates are not found among non-Indians living within these counties compared with those living in other areas of the States (data not shown).

Discussion

The average rates of gonorrhea and P&S syphilis among Native Americans were more than double

those among non-Native Americans for the 13 States examined from 1984 through 1988. The average gonorrhea rate among Native Americans from 1984 through 1988 in these 13 States was 1.4 times the average rate for the total United States during the same period, while the average P&S syphilis rate among Native Americans in these States was nearly equal to that for the total United States. In some States, particularly for P&S syphilis in Arizona and New Mexico in 1984 and 1985, the Native American rates were higher than those for any other minority group.

Among Native Americans in the 13 States combined, gonorrhea rates declined from 1984 through 1988, and P&S syphilis rates declined from 1985 through 1988. Among non-Native Americans in the 13 States combined, the decline in gonorrhea rates from 1985 through 1988 was proportionately less than that for Native Americans, while syphilis rates among non-Native Americans remained relatively stable from 1984 through 1988. Hence, the differential in reported STD morbidity between Native Americans and non-Native Americans has been narrowing. These trends are consistent with those seen for other health indicators, such as infant mortality (2), and for other infectious diseases, such as tuberculosis (6).

The decline in reported gonorrhea and P&S syphilis cases among all races may be due to a true decrease in morbidity, or it may result from a combination of factors, including decreased reporting, less access to clinic services, and a decline in screening programs. In Alaska, for example, a decline in screening for gonorrhea from 1987 to 1989 (unpublished data, State of Alaska, Quarterly Reports to Division of Sexually Transmitted Diseases, CDC, 1987-89) presumably has resulted in a decrease in the detection of gonorrhea among asymptomatic women. Underreporting of both syphilis and gonorrhea may have been exacerbated in recent years by the diversion of public health

resources from tracking syphilis and gonorrhea to HIV-AIDS prevention activities, thereby reducing the number of new cases of STD that are counted (20).

In general, STD rates among blacks are higher than those for Native Americans, while STD rates among whites are consistently lower. Reporting of STD from the public sector is known to be more complete than from the private sector (21,22). Because a larger proportion of minorities compared with whites seek health care from public clinics, minorities will be disproportionately represented in surveillance data. Thus, the disparity between Native American and white STD rates may be due at least in part to reporting bias. However, in another analysis from Seattle-King County (23), where case surveillance is more complete than in other locations, Native Americans were found to have incidence rates of gonorrhea five times higher than whites (unpublished data, H. H. Handsfield, MD, Professor of Medicine, University of Washington, Director, S.T.D. Control Program, Seattle-King County Department of Public Health, August 1989). Therefore, reporting bias alone may not account for the generally higher STD rates seen among Native Americans compared with non-Native Americans.

Some studies have described misclassification of Native Americans in health care settings. For example, in a children's blood pressure survey, 20 percent of the Native American children were classified as "white," "black," or "other" (24). Inconsistency in race reporting for Native Americans in alcoholism surveillance (25) and in AIDS case reporting (26) also has been documented.

Reported gonorrhea and syphilis case rates for Native Americans derived from State morbidity reports may also underestimate Native American case rates due to misclassification of Native Americans into other racial categories. Underreporting of STD among Native Americans may occur for a number of reasons, including lack of race recognition by clerks or medical personnel, and deliberate self misidentification due to fears of discrimination.

In IHS Service Areas, comprised chiefly of reservations and the surrounding counties, Native American identification is perhaps most accurate because only Native Americans are eligible for care at these facilities, and cases reported from IHS sites may be a more accurately coded as Native American by State STD programs. Thus, in some States, the STD rate for the IHS Service population may be a more accurate indicator of Native Ameri-

can morbidity than the total STD rate among Native Americans in the State as a whole. In Montana, California, and Colorado, the 1988 gonorrhea rates for the IHS Service populations were significantly higher than the rates for Indians in other areas of the States. However, without knowing true morbidity differences between Service and non-Service areas, we cannot for certain attribute the higher Service rates to better reporting.

Estimates of Native American populations used as denominators in calculating STD rates could also be low due to misclassification of race. In the 1980 census, Native Americans were enumerated almost entirely by self-identification, contributing to a greater than expected increase in the Native American population in the 1980 census compared with that of the 1970 census (27), and diminishing potential bias due to underestimated denominators. However, it is not possible to determine what effect, if any, denominator bias may have on the rates we calculated for Native American populations.

The large number of gonorrhea cases reported with "race not specified" in some States may also represent underreporting of cases in Native Americans. For the 13 States combined over the 5 years, 3.5 percent of gonorrhea cases were reported without specified race. Six States exceeded this percentage: Colorado (reporting 19 percent of cases with no racial identifiers), Utah (11 percent), Oregon (7 percent), Arizona (6 percent), Minnesota (6 percent), and Oklahoma (4 percent). California, the State with the largest Native American population, estimated to be 239,456 in 1988, reported 23 percent of its gonorrhea cases from 1984 through 1988 without specified race. Furthermore, Florida, Illinois, Michigan, and New York, together accounting for 8 percent of the U.S. Native American population, do not identify patients with gonorrhea by Native American race. Hence, a Native American rate based on the total gonorrhea cases reported from the entire U.S. Native American population probably underestimates true morbidity.

Reported rates of gonorrhea and syphilis are high among Native Americans; true STD morbidity among Native Americans may be higher due to inaccurate reporting by race. The extent of underreporting of STD cases among Native Americans deserves further study. These high case rates of STD among Native Americans represent preventable disease among a group already experiencing a disproportionate burden of poverty and ill health. Although the number of AIDS cases reported among Native Americans is relatively small com-

pared with other minority populations (28), the high rates of sexually transmitted infections we identified may indicate a potential for the spread of HIV within Native American communities, making STD prevention in Native American communities even more important.

Primary care providers should be aware of the increased risk for STD among Native Americans and other minority groups so that timely diagnosis, treatment, and case reporting can occur. Improved State STD surveillance with accurate and complete case reporting by race and ethnicity will help to identify special communities in need of targeted STD prevention and education activities. Improved surveillance will also serve as an important tool to evaluate STD-HIV prevention programs in Native American communities. This integrated approach to STD control is needed to reduce more effectively the burden of STD and their sequelae among American Indians and Alaska Natives.

References.....

1. Johnson, D., Paisano, E., and Levin, M.: We, the first Americans. Bureau of the Census, December 1988.
2. U.S. Congress, Office of Technology Assessment: Indian health care. OTA-H-290. U.S. Government Printing Office, Washington, DC, 1986, pp. 3-40.
3. Beavais, F., Oetting, E. R., Wolf, W., and Edwards, R. W.: American Indian youth and drugs, 1976-87: a continuing problem. *Am J Public Health* 79: 634-636 (1989).
4. Saad, M. F., et al.: The natural history of impaired glucose tolerance in the Pima Indians. *N Engl J Med* 319: 1500-1506, Dec. 8, 1988.
5. Sievers, M. L., and Fisher, J. R.: Diabetes in North American Indians. *In* Diabetes in America. Public Health Service, Publication No. (NIH) 85-1468, Bethesda, MD, August 1985, Ch. 11, pp. 1-20.
6. Reider, H. L.: Notes on the history of an epidemic: tuberculosis among North American Indians. *The IHS Primary Care Provider* 14: 45-50 (1989).
7. Bennion, L. F., et al.: Development of lithogenic bile during puberty in Pima Indians. *N Engl J Med* 300: 873-876, Apr. 19, 1979.
8. Westrom, L.: Incidence, prevalence, and trends of acute pelvic inflammatory disease and its consequences in industrialized countries. *Am J Obstet Gynecol* 138: 880-892 (1980).
9. Cates, W. C., and Alexander, E. R.: Sexually transmitted diseases and the fetus, a continuing challenge. *In* Impact on the fetus of parental sexually transmitted disease, edited by R. B. Kundsin, L. Falk, and S. S. Hipp. *Ann NY Acad Sci* 549: 1-16 (1988).
10. Koutsky, L. A., Galloway, D. A., and Holmes, K. K.: Epidemiology of genital human papillomavirus infection. *Epidemiologic Rev* 10: 122-163 (1988).
11. Rhoades, E.: Letter to IHS providers: sexually transmitted diseases. *The IHS Primary Care Provider* 11: 165-166 (1986).
12. Blackwood, L.: Epidemiology of gonorrhea in native Alaskans. *Br J Vener Dis* 57: 372-375 (1981).
13. Harrison, H. R., et al.: The prevalence of genital *Chlamydia trachomatis* and mycoplasmal infections during pregnancy in an American Indian population. *Sex Transm Dis* 10: 18-20 (1983).
14. Schaefer, C., Harrison, H. R., Boyce, W. T., and Lewis, M.: Illnesses in infants born to women with *Chlamydia trachomatis* infection. *Am J Dis Child* 139: 127-133 (1985).
15. Toomey, K. E., Rafferty, M. P., and Stamm, W. E.: Unrecognized high prevalence of *Chlamydia trachomatis* cervical infection in an isolated Alaskan Eskimo population. *JAMA* 258: 53-56, July 3, 1987.
16. Gerber, A. R., King, L. C., Dunleavy, G. J., and Novick, L. F.: An outbreak of syphilis on an Indian reservation: descriptive epidemiology and disease-control measures. *Am J Public Health* 79: 83-85 (1989).
17. Schwarcz, S. K., and Toomey, K. E.: Congenital syphilis update. *The IHS Primary Care Provider* 13: 21-23 (1988).
18. U.S. Bureau of the Census: General population characteristics, United States summary, 1980, tables 47 and 63. *Current Population Reports; Series P-25, No. 949* (May 1984), No. 1017 (October 1988), No. 1024 (May 1988), and No. 1040-RD-1 (May 1989); *Series P-26, No. 87-A* (September 1988); and Press Release CB88-205, December 1988.
19. Moran, J. S., Aral, S. O., Jenkins, W. C., Peterman, T. A., and Alexander, E. R.: The impact of sexually transmitted diseases on minority populations. *Public Health Rep* 104: 560-565, November-December 1989.
20. Turner, C. F., Miller, H. G., and Moses, L. E.: AIDS: sexual behavior and intravenous drug use. National Academy Press, Washington, DC, 1989, p. 16.
21. Curtis, A. C.: National survey of venereal disease treatment. *JAMA* 186: 46-49, Oct. 5, 1963.
22. Fleming, W. L., et al.: National survey of venereal disease treated by physicians in 1968. *JAMA* 211: 1827-1830, Mar. 16, 1970.
23. Handsfield, H. H., Rice, R. J., Roberts, M. C., and Holmes, K. K.: Localized outbreak of penicillinase-producing *Neisseria gonorrhoeae*: paradigm for introduction and spread of gonorrhea in a community. *JAMA* 261:2357-2361, Apr. 28, 1989.
24. Gillum, R. F., Gomez-Marin, O., and Prineas, R. J.: Discrepancies in racial designations of school children in Minneapolis. *Public Health Rep* 103: 485-488, September-October 1988.
25. Westermeyer, J.: Problems with surveillance methods for alcoholism: differences in coding systems among federal, state, and private agencies. *Am J Public Health* 78:130-133 (1988).
26. Lieb, L., et al.: Evaluating racial classification among Native American Indians with AIDS in Los Angeles County, California. Abstract T.A.P. 67. Program abstracts. AIDS: the scientific and social challenge. V International Conference on AIDS. Montreal, Canada, June 1989, p. 110.
27. Passel, J. S., and Berman, P. A.: Quality of 1980 census data for American Indians. *Social Biology* 33: 163-182 (1986).
28. Centers for Disease Control: HIV/AIDS Surveillance Report, August 1989, pp. 1-16.